

**In the Claims:**

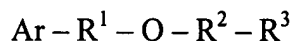
Please cancel claims 67-72, 75, 76, 84-86, 94-96 and 126-140 and add claims 158-165 as follows:

**1-57. (canceled)**

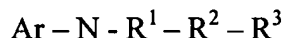
**58. (previously presented)** A pharmaceutical composition comprising:

- a) a polynucleotide function enhancer; and
- b) A DNA molecule that comprises a DNA sequence that encodes an antigen from an intracellular pathogen; wherein

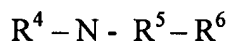
i) said polynucleotide function enhancer is a compound having one of the following formulas:



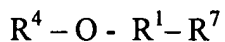
or



or



or



wherein:

Ar is benzene, *p*-aminobenzene, *m*-aminobenzene, *o*-aminobenzene, substituted benzene, substituted *p*-aminobenzene, substituted *m*-aminobenzene, substituted *o*-aminobenzene, wherein the amino group in the aminobenzene compounds can be amino, C<sub>1</sub> - C<sub>5</sub> alkylamine, C<sub>1</sub>-C<sub>5</sub>, C<sub>1</sub>-C<sub>5</sub> dialkylamine and substitutions in substituted compounds are halogen, C<sub>1</sub>-C<sub>5</sub> alkyl and C<sub>1</sub>-C<sub>5</sub> alkoxy;

R<sup>1</sup> is C=O;

R<sup>2</sup> is C<sub>1</sub>-C<sub>10</sub> alkyl including branched alkyls;

$R^3$  is hydrogen, amine,  $C_1$ - $C_5$  alkylamine,  $C_1$ - $C_5$ ,  $C_1$ - $C_5$  dialkylamine;

$R^2 + R^3$  can form a cyclic alkyl, a  $C_1$ - $C_{10}$  alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a  $C_1$ - $C_{10}$  alkyl substituted cyclic aliphatic amine, a heterocycle, a  $C_1$ - $C_{10}$  alkyl substituted heterocycle including a  $C_1$ - $C_{10}$  alkyl N-substituted heterocycle;

$R^4$  is Ar,  $R^2$  or  $C_1$ - $C_5$  alkoxy, a cyclic alkyl, a  $C_1$ - $C_{10}$  alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a  $C_1$ - $C_{10}$  alkyl substituted cyclic aliphatic amine, a heterocycle, a  $C_1$ - $C_{10}$  alkyl substituted heterocycle and a  $C_1$ - $C_{10}$  alkoxy substituted heterocycle including a  $C_1$ - $C_{10}$  alkyl N-substituted heterocycle;

$R^5$  is  $C=NH$ ;

$R^6$  is Ar,  $R^2$  or  $C_1$ - $C_5$  alkoxy, a cyclic alkyl, a  $C_1$ - $C_{10}$  alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a  $C_1$ - $C_{10}$  alkyl substituted cyclic aliphatic amine, a heterocycle, a  $C_1$ - $C_{10}$  alkyl substituted heterocycle and a  $C_1$ - $C_{10}$  alkoxy substituted heterocycle including a  $C_1$ - $C_{10}$  alkyl N-substituted heterocycle; and,

$R^7$  is Ar,  $R^2$  or  $C_1$ - $C_5$  alkoxy, a cyclic alkyl, a  $C_1$ - $C_{10}$  alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a  $C_1$ - $C_{10}$  alkyl substituted cyclic aliphatic amine, a heterocycle, a  $C_1$ - $C_{10}$  alkyl substituted heterocycle and a  $C_1$ - $C_{10}$  alkoxy substituted heterocycle including a  $C_1$ - $C_{10}$  alkyl N-substituted heterocycle; and,

ii) said DNA sequence operatively linked to regulatory sequences which control the expression of said DNA sequence.

**59. (original)**                      The pharmaceutical composition of claim 58 wherein said DNA molecule is a plasmid.

**60-62. (canceled)**

**63. (Previously presented)**    The pharmaceutical composition of claim 58 wherein said antigen is a viral antigen.

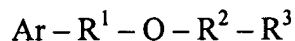
**64. (previously presented)** The pharmaceutical composition of claim 63 wherein said pathogen is a virus selected from the group consisting of: human immunodeficiency virus, HIV; Human T cell leukemia virus, HTLV; influenza virus; hepatitis A virus; hepatitis B virus; hepatitis C virus; human papilloma virus, HPV; Herpes simplex 1 virus, HSV1; Herpes simplex 2 virus, HSV2; Cytomegalovirus, CMV; Epstein-Barr virus, EBR; rhinovirus; and, coronavirus.

**65-114. (canceled)**

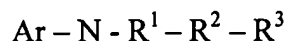
**115. (previously presented)** A method of introducing DNA molecules into cells of an individual comprising the steps of:

injecting into tissue of said individual at a site on said individual's body, DNA molecules and a polynucleotide function enhancer; wherein

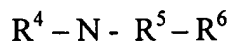
i) said polynucleotide function enhancer is a compound having one of the following formulas:



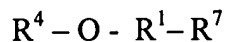
or



or



or



wherein:

Ar is benzene, *p*-aminobenzene, *m*-aminobenzene, *o*-aminobenzene, substituted benzene, substituted *p*-aminobenzene, substituted *m*-aminobenzene, substituted *o*-aminobenzene, wherein the amino group in the aminobenzene compounds can be amino, C<sub>1</sub> - C<sub>5</sub> alkylamine, C<sub>1</sub>-

C<sub>5</sub>, C<sub>1</sub>-C<sub>5</sub> dialkylamine and substitutions in substituted compounds are halogen, C<sub>1</sub>-C<sub>5</sub> alkyl and C<sub>1</sub>-C<sub>5</sub> alkoxy;

R<sup>1</sup> is C=O;

R<sup>2</sup> is C<sub>1</sub>-C<sub>10</sub> alkyl including branched alkyls;

R<sup>3</sup> is hydrogen, amine, C<sub>1</sub>-C<sub>5</sub> alkylamine, C<sub>1</sub>-C<sub>5</sub>, C<sub>1</sub>-C<sub>5</sub> dialkylamine;

R<sup>2</sup> + R<sup>3</sup> can form a cyclic alkyl, a C<sub>1</sub>-C<sub>10</sub> alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a C<sub>1</sub>-C<sub>10</sub> alkyl substituted cyclic aliphatic amine, a heterocycle, a C<sub>1</sub>-C<sub>10</sub> alkyl substituted heterocycle including a C<sub>1</sub>-C<sub>10</sub> alkyl N-substituted heterocycle;

R<sup>4</sup> is Ar, R<sup>2</sup> or C<sub>1</sub>-C<sub>5</sub> alkoxy, a cyclic alkyl, a C<sub>1</sub>-C<sub>10</sub> alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a C<sub>1</sub>-C<sub>10</sub> alkyl substituted cyclic aliphatic amine, a heterocycle, a C<sub>1</sub>-C<sub>10</sub> alkyl substituted heterocycle and a C<sub>1</sub>-C<sub>10</sub> alkoxy substituted heterocycle including a C<sub>1</sub>-C<sub>10</sub> alkyl N-substituted heterocycle;

R<sup>5</sup> is C=NH;

R<sup>6</sup> is Ar, R<sup>2</sup> or C<sub>1</sub>-C<sub>5</sub> alkoxy, a cyclic alkyl, a C<sub>1</sub>-C<sub>10</sub> alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a C<sub>1</sub>-C<sub>10</sub> alkyl substituted cyclic aliphatic amine, a heterocycle, a C<sub>1</sub>-C<sub>10</sub> alkyl substituted heterocycle and a C<sub>1</sub>-C<sub>10</sub> alkoxy substituted heterocycle including a C<sub>1</sub>-C<sub>10</sub> alkyl N-substituted heterocycle; and,

R<sup>7</sup> is Ar, R<sup>2</sup> or C<sub>1</sub>-C<sub>5</sub> alkoxy, a cyclic alkyl, a C<sub>1</sub>-C<sub>10</sub> alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a C<sub>1</sub>-C<sub>10</sub> alkyl substituted cyclic aliphatic amine, a heterocycle, a C<sub>1</sub>-C<sub>10</sub> alkyl substituted heterocycle and a C<sub>1</sub>-C<sub>10</sub> alkoxy substituted heterocycle including a C<sub>1</sub>-C<sub>10</sub> alkyl N-substituted heterocycle; and,

ii) said DNA molecules are taken up by cells in said tissue.

**116. (previously presented)** The method of claim 115 wherein said DNA molecule comprises a DNA sequence that encodes a protein, said DNA sequence operatively linked to regulatory sequences which control the expression of said DNA sequence.

**117. (previously presented)** The method of claim 115 wherein said DNA molecule is a plasmid.

**118. (previously presented)** The method of claim 115 wherein said tissue includes skin and muscle.

**119. (previously presented)** The method of claim 115 wherein said tissue is skin.

**120. (previously presented)** The method of claim 115 wherein said tissue is muscle.

**121. (previously presented)** The method of claim 120 wherein said tissue is skeletal muscle.

**122. (previously presented)** A pharmaceutical composition according to claim 58, wherein said polynucleotide function enhancer is a compound having the formula  $\text{Ar} - \text{R}^1 - \text{O} - \text{R}^2 - \text{R}^3$ .

**123. (previously presented)** The pharmaceutical composition of claim 122 wherein said DNA molecule is a plasmid.

**124. (previously presented)** The pharmaceutical composition of claim 122 wherein said antigen is a viral antigen.

**125. (previously presented)** The pharmaceutical composition of claim 124 wherein said pathogen is a virus selected from the group consisting of : human immunodeficiency virus, HIV; Human T cell leukemia virus, HTLV; influenza virus; hepatitis A virus; hepatitis B virus; hepatitis C virus; human papilloma virus, HPV; Herpes simplex 1 virus, HSV1; Herpes simplex 2 virus, HSV2; Cytomegalovirus, CMV; Epstein-Barr virus, EBR; rhinovirus; and, coronavirus.

**126-140 (canceled)**

**141. (previously presented)** A method of introducing DNA molecules into cells of an individual according to claim 115, wherein said polynucleotide function enhancer is a compound having the formula  $\text{Ar} - \text{R}^1 - \text{O} - \text{R}^2 - \text{R}^3$ .

**142. (previously presented)** The method of claim 141 wherein said DNA molecule comprises a DNA sequence that encodes a protein, said DNA sequence being operatively linked to regulatory sequences which control the expression of said DNA sequence.

**143. (previously presented)** The method of claim 141 wherein said DNA molecule is a plasmid.

**144. (previously presented)** The method of claim 141 wherein said tissue includes skin and muscle.

**145. (previously presented)** The method of claim 141 wherein said tissue is skin.

**146. (previously presented)** The method of claim 141 wherein said tissue is muscle.

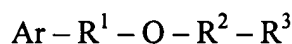
**147. (previously presented)** The method of claim 146 wherein said tissue is skeletal muscle.

**148. (currently amended)** A method of inducing antibodies against an antigen in an individual comprising the steps of:

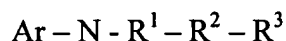
injecting into tissue of said individual at a site on said individual's body, a DNA molecule and a polynucleotide function enhancer,

said DNA molecule comprising a DNA sequence that encodes an antigen, said DNA sequence operatively linked to regulatory sequences which control the expression of said DNA sequence,

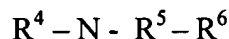
said polynucleotide function enhancer is a compound having one of the following formula:



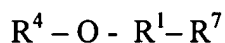
or



or



or



wherein:

Ar is benzene, *p*-aminobenzene, *m*-aminobenzene, *o*-aminobenzene, substituted benzene, substituted *p*-aminobenzene, substituted *m*-aminobenzene, substituted *o*-aminobenzene, wherein the amino group in the aminobenzene compounds can be amino, C<sub>1</sub>-C<sub>5</sub> alkylamine, C<sub>1</sub>-C<sub>5</sub>, C<sub>1</sub>-C<sub>5</sub> dialkylamine and substitutions in substituted compounds are halogen, C<sub>1</sub>-C<sub>5</sub> alkyl and C<sub>1</sub>-C<sub>5</sub> alkoxy;

R<sup>1</sup> is C=O;

R<sup>2</sup> is C<sub>1</sub>-C<sub>10</sub> alkyl including branched alkyls;

R<sup>3</sup> is hydrogen, amine, C<sub>1</sub>-C<sub>5</sub> alkylamine, C<sub>1</sub>-C<sub>5</sub>, C<sub>1</sub>-C<sub>5</sub> dialkylamine;

R<sup>2</sup> + R<sup>3</sup> can form a cyclic alkyl, a C<sub>1</sub>-C<sub>10</sub> alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a C<sub>1</sub>-C<sub>10</sub> alkyl substituted cyclic aliphatic amine, a heterocycle, a C<sub>1</sub>-C<sub>10</sub> alkyl substituted heterocycle including a C<sub>1</sub>-C<sub>10</sub> alkyl N-substituted heterocycle;

R<sup>4</sup> is Ar, R<sup>2</sup> or C<sub>1</sub>-C<sub>5</sub> alkoxy, a cyclic alkyl, a C<sub>1</sub>-C<sub>10</sub> alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a C<sub>1</sub>-C<sub>10</sub> alkyl substituted cyclic aliphatic amine, a heterocycle, a C<sub>1</sub>-C<sub>10</sub>

alkyl substituted heterocycle and a C<sub>1</sub>-C<sub>10</sub> alkoxy substituted heterocycle including a C<sub>1</sub>-C<sub>10</sub> alkyl N-substituted heterocycle;

R<sup>5</sup> is C=NH;

R<sup>6</sup> is Ar, R<sup>2</sup> or C<sub>1</sub>-C<sub>5</sub> alkoxy, a cyclic alkyl, a C<sub>1</sub>-C<sub>10</sub> alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a C<sub>1</sub>-C<sub>10</sub> alkyl substituted cyclic aliphatic amine, a heterocycle, a C<sub>1</sub>-C<sub>10</sub> alkyl substituted heterocycle and a C<sub>1</sub>-C<sub>10</sub> alkoxy substituted heterocycle including a C<sub>1</sub>-C<sub>10</sub> alkyl N-substituted heterocycle; and,

R<sup>7</sup> is Ar, R<sup>2</sup> or C<sub>1</sub>-C<sub>5</sub> alkoxy, a cyclic alkyl, a C<sub>1</sub>-C<sub>10</sub> alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a C<sub>1</sub>-C<sub>10</sub> alkyl substituted cyclic aliphatic amine, a heterocycle, a C<sub>1</sub>-C<sub>10</sub> alkyl substituted heterocycle and a C<sub>1</sub>-C<sub>10</sub> alkoxy substituted heterocycle including a C<sub>1</sub>-C<sub>10</sub> alkyl N-substituted heterocycle; and,

wherein said DNA molecule is taken up by cells in said tissue, said DNA sequence is expressed in said cells and an antibody ~~immune response~~ is generated against said antigen.

**149. (previously presented)** The method of claim 148 wherein said polynucleotide function enhancer is a compound having the formula Ar - R<sup>1</sup> - O - R<sup>2</sup> - R<sup>3</sup>.

**150. (previously presented)** The method of claim 148 wherein said DNA molecule is a plasmid.

**151. (previously presented)** The method of claim 148 wherein said antigen is an intracellular pathogen antigen.

**152. (previously presented)** The method of claim 148 wherein said antigen is a viral antigen.



**153. (previously presented)** The method of claim 152 wherein said viral antigen is of a virus selected from the group consisting of: human immunodeficiency virus, HIV; Human T cell leukemia virus, HTLV; influenza virus; hepatitis A virus; hepatitis B virus; hepatitis C virus; human papilloma virus, HPV; Herpes simplex 1 virus, HSV1; Herpes simplex 2 virus, HSV2; Cytomegalovirus, CMV; Epstein-Barr virus, EBR; rhinovirus; and, coronavirus.

**154. (previously presented)** The method of claim 148 wherein said tissue includes skin and muscle.

**155. (previously presented)** The method of claim 154 wherein said tissue is skin.

**156. (previously presented)** The method of claim 154 wherein said tissue is muscle.

**157. (previously presented)** The method of claim 156 wherein said tissue is skeletal muscle.

**158. (new)** The method of claim 149 wherein said DNA molecule is a plasmid.

**159. (new)** The method of claim 149 wherein said antigen is an intracellular pathogen antigen.

**160. (new)** The method of claim 149 wherein said antigen is a viral antigen.

**161. (new)** The method of claim 160 wherein said viral antigen is of a virus selected from the group consisting of: human immunodeficiency virus, HIV; Human T cell leukemia virus, HTLV; influenza virus; hepatitis A virus; hepatitis B virus; hepatitis C virus; human papilloma virus, HPV; Herpes simplex 1 virus, HSV1; Herpes simplex 2 virus, HSV2; Cytomegalovirus, CMV; Epstein-Barr virus, EBR; rhinovirus; and, coronavirus.

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**PATENT**

**Serial Number: 09/359,975**  
**Filed: July 23, 1999**

**162. (new)** The method of claim 149 wherein said tissue includes skin and muscle.

**163. (new)** The method of claim 162 wherein said tissue is skin.

**164. (new)** The method of claim 162 wherein said tissue is muscle.

**165. (new)** The method of claim 164 wherein said tissue is skeletal muscle.